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Attention: S. W. Ahrends, Director
Technical Services Division

Subject: Bechtel Job No. 14501, FUSRAP Project
DOE Contract No. DE-AC05-81OR20722
Geologic/Hydrologic Letter Report on 1986
Drilling Activities at the SLAPS
Code: 5220/WBS 153

Dear Mr. Ahrends:

This is in response to Jerry Wing's letter of July 8 (DOE No. 870435; our CCN 046108), which transmits to us comments from DOE Headquarters on the subject report. As directed, we have incorporated the comments and have enclosed six copies of the revised report with this letter.

Please let us know if any further action is required.

Very truly yours,

Steven D Liedle

Steven D. Liedle
Project Manager - FUSRAP

AMF/amf

Enclosures: As Stated

cc: J. D. Berger (ORAU) (w/a)
S. H. McCracken (w/o)
B. A. Hughlett (w/o)
J. F. Wing (w/o)

CONCURRENCE

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ST. LOUIS AIRPORT SITE
1986 FIELD DRILLING ACTIVITIES,
GEOTECHNICAL DISCUSSION

INTRODUCTION

A drilling program conducted by Bechtel National, Inc. (BNI) was implemented at the St. Louis Airport Site (SLAPS) in 1986. Radiological characterization of the site was the primary purpose of the field program; however, the study did include limited collection of geotechnical data. The geotechnical information will be used to help determine whether the site should be considered for use as a permanent disposal facility for residual radioactive materials. None of the geotechnical information collected during this investigation indicates that the site should not remain under consideration as a location for installation of a disposal facility for residual radioactive materials.

PURPOSE

The purpose of this report is to discuss the geotechnical data and to describe the drilling program. The geotechnical information collected during the 1986 field activities, combined with that collected by previous investigators, is insufficient to provide a detailed description of the geologic and hydrogeologic conditions at the site. Because of the possibility that subsurface samples collected during the 1986 work were radioactively contaminated, the samples were not tested to determine their engineering properties. In addition, to avoid causing possible damage to the natural strata that would form part of the containment cell floor if a disposal facility is constructed at this site, no holes penetrating below the unconfined groundwater system were drilled, except along the southern boundary of the site.

1986 Work

The 1986 drilling included limited geologic borings, installation of monitoring wells, and radiological and chemical characterization test borings (Figure 1). Monitoring wells were installed along the southern boundary of the site to monitor the near-surface (0- to 80-ft) groundwater systems. All of these drill holes were radiologically logged, and samples were collected for radiological analysis. Samples were also collected from the chemical characterization drill holes so that analysis for non-radioactive contaminants could be performed. Wherever possible, combinations of activities were conducted in the same drill hole.

The geologic logs for each of the holes drilled in 1986 are available in BNI records (Ref. 1). The following is a listing of the types of holes drilled:

- Sixteen holes were drilled for geologic characterization (denoted in the geologic logs by a "G" preceding the hole number)
- Seventy-five holes were drilled for radiological characterization (denoted by "R")
- Ten holes were drilled for chemical characterization (denoted by "C")
- Monitoring wells were installed at 10 locations (denoted by "M")

The observation well logs for the 10 monitoring wells are available in BNI records (Ref. 1).

Previous Work

Roy F. Weston Consultants conducted an initial study of the SLAPS area in 1981. The Weston study included a detailed topographic survey, compilation of the site history, laboratory analyses of sediments, and a general geologic and hydrogeologic evaluation. During the course of the study, Weston Consultants installed a total of 25 monitoring wells and piezometers and drilled three deep borings.

GENERAL GEOLOGY

The site is located in a geologic structure known as the Florissant Basin (Figure 2). The basin, which developed in the nearly flat-lying bedrock, is filled with Pleistocene- to Holocene-age sediments.

The sediments that fill the Florissant Basin unconformably overlie gently folded Mississippian and Pennsylvanian sedimentary rocks. The Mississippian and Pennsylvanian sequence consists of limestones with minor shales and sandstones. Coldwater Creek, which is the main surface water drainage in the approximately 15-mi^2 basin, borders the west side of the SLAPS.

Lake and river sediments in the Florissant Basin form the shallow (0- to 80-ft) hydrogeologic systems beneath the site. The sediments are mainly silts and clays with some sand and some highly organic zones. The continuity, mineralogy, thickness, and distribution of the clay horizons are important, because those low-permeability layers control the distribution and flow of the shallow groundwater.

Artificial Fill

Artificial fill includes all materials that have been dumped at the SLAPS; this type of fill material forms the top "stratigraphic" layer over the entire site. The fill is quite variable in character; it includes reworked natural material, rebar, metal scrap, reinforced concrete, asphalt, limestone gravel, glass, fiberglass, wood, and radioactive waste. Based on gamma logs of the boreholes, the highest radioactive contamination levels generally appear to be near the base of the artificial fill. These areas of higher-activity contamination are in many cases covered with radiologically clean silt, sand, and/or gravel.

DRILLING PROGRAM

Drilling began May 22, 1986 and continued through July 28, 1986. Figure 1 shows the locations of the drill holes throughout the site.

Two drill rigs, a truck-mounted CME-55, and a Mobile B53 mounted on an all-terrain vehicle operated during most of the drilling period. Since the CME-55 was outfitted to conduct permeability tests, it was used to drill all of the monitoring wells and most of the geologic holes. A BNI geologist monitored each rig and logged the samples as they were received from the subcontractor; lithologic logs were prepared for each hole. All holes were radiologically logged by Thermo Analytical/Eberline (TMA/E), the radiological support subcontractor. The TMA/E representatives also collected the samples for radiological and chemical analysis. Table 1 is a summary of the drill holes.

Due to the presence or suspected presence of radioactive materials, procedures were implemented to ensure that contamination was not introduced to new areas or to personnel. Augers were cleaned and scanned for contamination before each hole was begun. Drill spoils were placed in a storage pile which was covered with geomembrane material. Drilling equipment and vehicles were decontaminated before leaving the site.

Disturbed and undisturbed samples were taken with standard, 2-ft split-barrel samplers and thin-wall or Shelby tubes. The thin-wall tube samples were immediately extruded for logging and packaging. The split-barrel samplers were generally pushed, but were driven where blow counts were required or where driving improved sampling efficiency.

Undisturbed samples were collected for laboratory analysis to provide data on mineralogic, sedimentologic, and hydrologic properties of selected zones. The samples were sealed with wax in 2-ft Shelby tubes. All sampling tools and other downhole items were decontaminated before each downhole use.

Geologic Holes

Geologic holes were drilled to provide detailed stratigraphic information to begin development of a geologic model of the site. These holes were drilled to the base of the unconfined groundwater

system. Permeability tests were performed at selected intervals, and undisturbed samples were collected to help characterize the selected stratigraphic interval. The top 10- to 15-ft segment of each geologic hole was sampled continuously to provide samples for radiological characterization. At depths greater than 15 ft, the hole was sampled as needed to characterize the stratigraphy. The geologic holes ranged from 30 to 50 ft in depth; their locations are shown in Figure 1.

Monitoring Wells

Four deep monitoring wells and six shallow wells were installed along the southern and western boundaries of the site to augment the wells installed throughout the site during the investigation conducted by Weston in 1981. The new shallow monitoring wells are screened in the unconfined groundwater system, the base of which is defined by a clayey aquitard. The deep monitoring wells intercept the sediments below the aquitard and above Paleozoic bedrock. Permeability tests were performed at various depths in the new wells to characterize water-bearing zone and aquitard properties. The permeability data will be included in the final report on the geotechnical investigation of the site and its vicinity.

Not all of the wells and piezometers installed by Weston are incorporated in the monitoring program currently in effect for the site. This monitoring program is a continuation of the program established by Oak Ridge National Laboratory (ORNL) and reported by ORNL in 1984 (Ref. 2). The new wells installed by BNI during the drilling conducted in 1986 have been added to the monitoring program. An evaluation of all installed wells and piezometers is planned to maximize utilization of the available installations.

Radiological Borings

Radiological borings were drilled on a 100-ft grid throughout the site with minor adjustments where obstructions prevented drilling at the precise locations of the grid points. One supplementary hole (R14-13.5) was drilled to investigate a lined pit that was not at a

grid point (Figure 1). Continuous samples were taken through the artificial fill material and extending approximately 5 ft further, into undisturbed material. The radiological borings ranged in depth from 10 to 15 ft. TMA/E was responsible for handling, packaging, and labeling all samples collected for radiological analysis.

Chemical Borings

The soil samples from drill holes designated to detect presence of chemical contaminants were split for both chemical analysis and radiological analysis. The chemical holes were drilled in the same manner as the radiological holes, but additional decontamination steps were taken to minimize opportunity for cross-contamination between soil samples and thereby improve analytical accuracy. The chemical holes ranged from 10 to 15 ft in depth.

GEOTECHNICAL DISCUSSION

The stratigraphic details noted by previous investigators in describing the lacustrine sediments and related groundwater system were not readily identified during the 1986 field activities. Only some of the holes drilled in 1986 along the southern boundary of the site penetrated the lacustrine sediments; therefore, the full stratigraphic sequence of those materials is described in the logs of only these holes. All 1986 drill hole logs show a general stratigraphic sequence similar to that previously logged; however, correlation of detail within the sequence is not clear (Figures 3, 4, and 5).

In general, the lacustrine sediments are fine-grained with various percentages of clay; therefore, permeabilities probably range from low to very low for these materials. Because of the possibility that the samples were radioactively contaminated, no laboratory permeability or other engineering tests were performed on any samples collected from the drill holes. The samples have been retained and are to be tested during FY 1988 in a laboratory equipped to handle radioactively contaminated samples.

The presence of multiple clay or clayey strata within the lacustrine sequence indicates that if these layers are continuous across the site, it is possible and even likely that several groundwater systems also exist there. If hydraulically isolated groundwater systems exist at the site, then each system would be expected to have a representative potentiometric surface at a given location. To test for this possibility, periodic water level measurements were made in some of the deeper drill holes along the southern boundary of the site while drilling was in progress. Very little time was available to allow for stabilization of the water level before measurements were taken, but the levels measured appeared to support the presence of three groundwater systems above the base of the lacustrine sediments. One system is unconfined, and the other two are probably semiconfined.

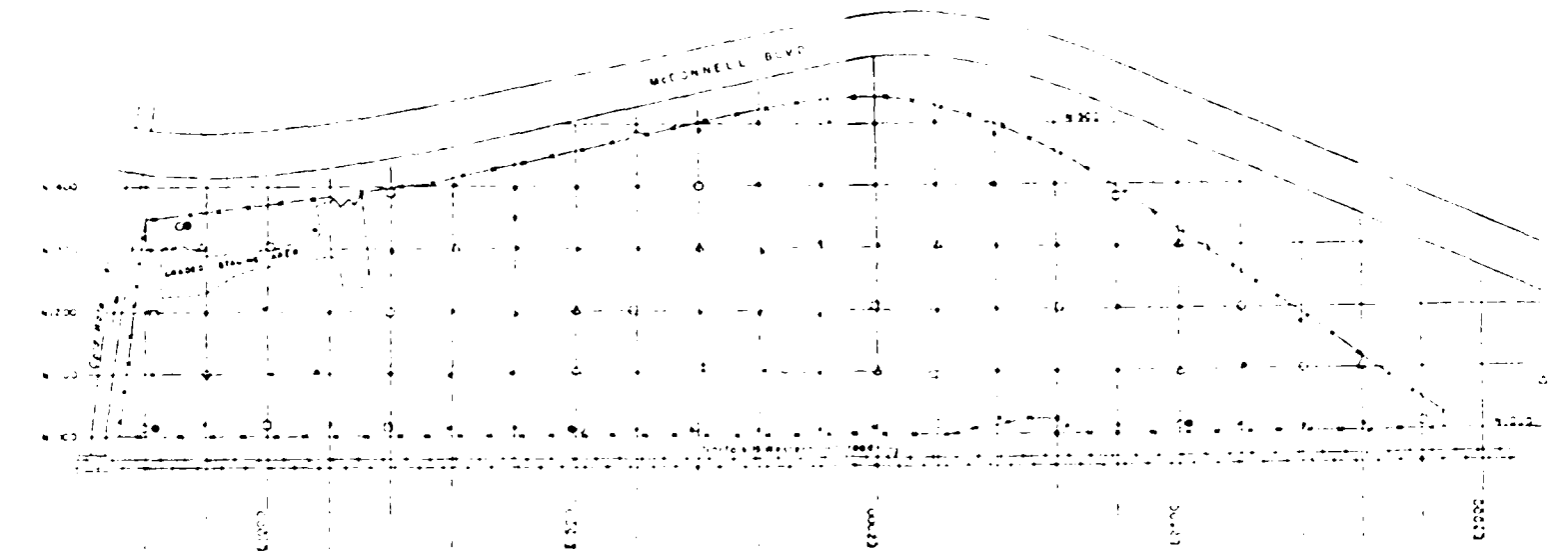
FUTURE GEOLOGIC ACTIVITIES

Additional monitoring wells will be installed down gradient from the wastes located on the SLAPS. Some of the wells will be screened in the shallow or unconfined groundwater system, and the others will be screened in the deeper groundwater system below the clayey aquitard. The drill holes for these wells and others drilled specifically to gather subsurface data about geologic conditions will provide the means to complete a geologic model of the SLAPS. Soil samples will be collected for testing to determine their engineering properties and for laboratory examination to identify and describe the soil materials. The tests will include determination of distribution coefficient and cation exchange capacity of the soils.

REFERENCES

1. Memorandum, J. A. Blanke, Bechtel National, Inc., to M. G. Jones. "1986 SLAPS Logs," CCN 042744, Oak Ridge, TN, January 21, 1987.

2. Oak Ridge National Laboratory. Results of the Groundwater Monitoring Program Performed at the Former St. Louis Airport Storage Site for the Period of January 1981 Through January 1983, ORNL/TM-8879, Oak Ridge, TN, March 1984.

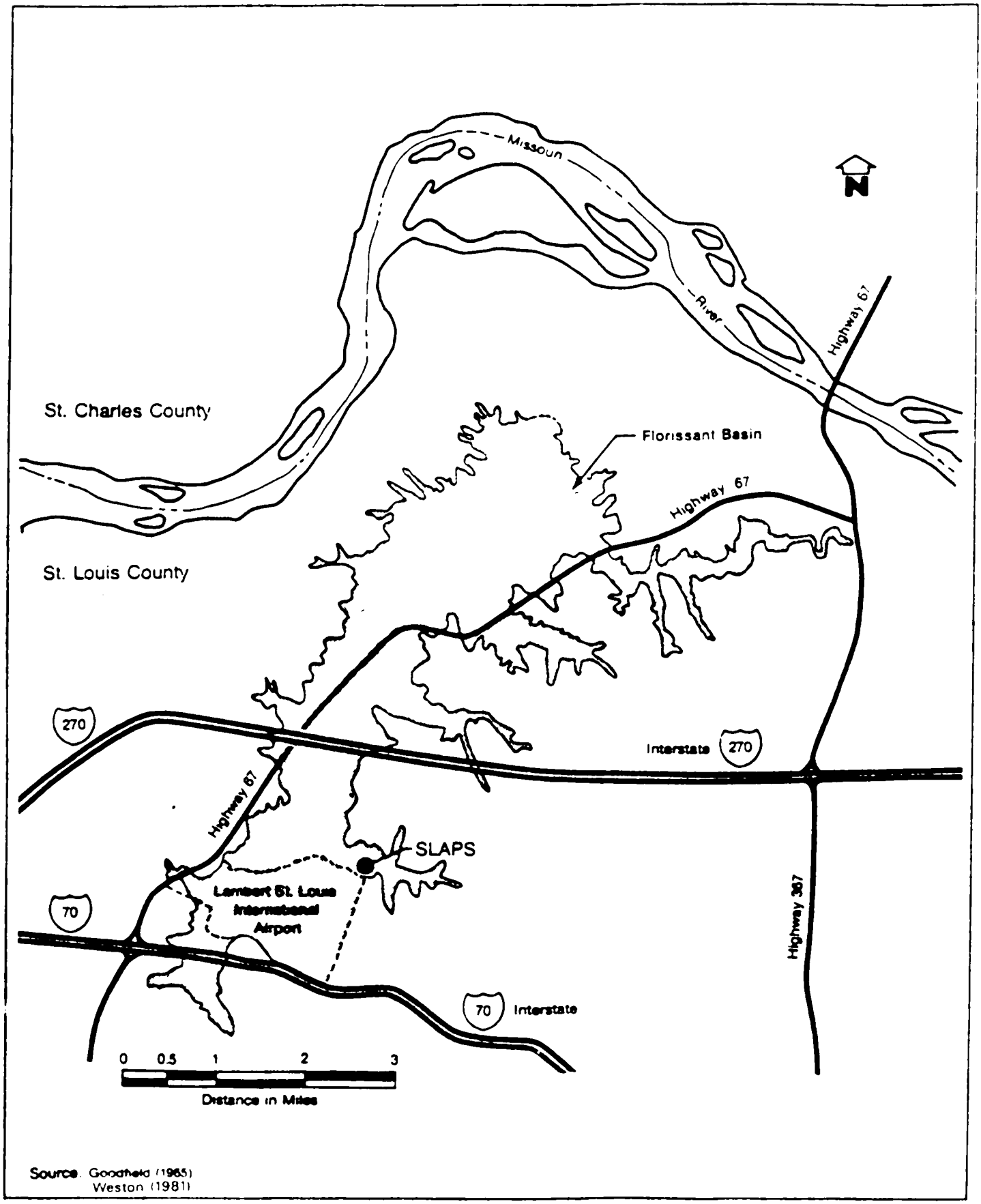


EXPLANATION

- RADIOLOGICAL HOLE
- CHEMICAL HOLE
- GEOLOGY HOLE
- SHALLOW MONITORING WELL
- DEEP MONITORING WELL
- FENCE AROUND PERIMETER OF SITE
- RAILROAD
- APPROXIMATE BOUNDARY OF STAGING AREA (GRADED WITH UNCONTAMINATED FILL)

FIGURE 1

DRILL HOLE LOCATIONS



Source: Goodfield (1965)
Weston (1981)

FIGURE 2 **SITE LOCATION MAP SHOWING OUTLINE OF FLORISSANT BASIN**

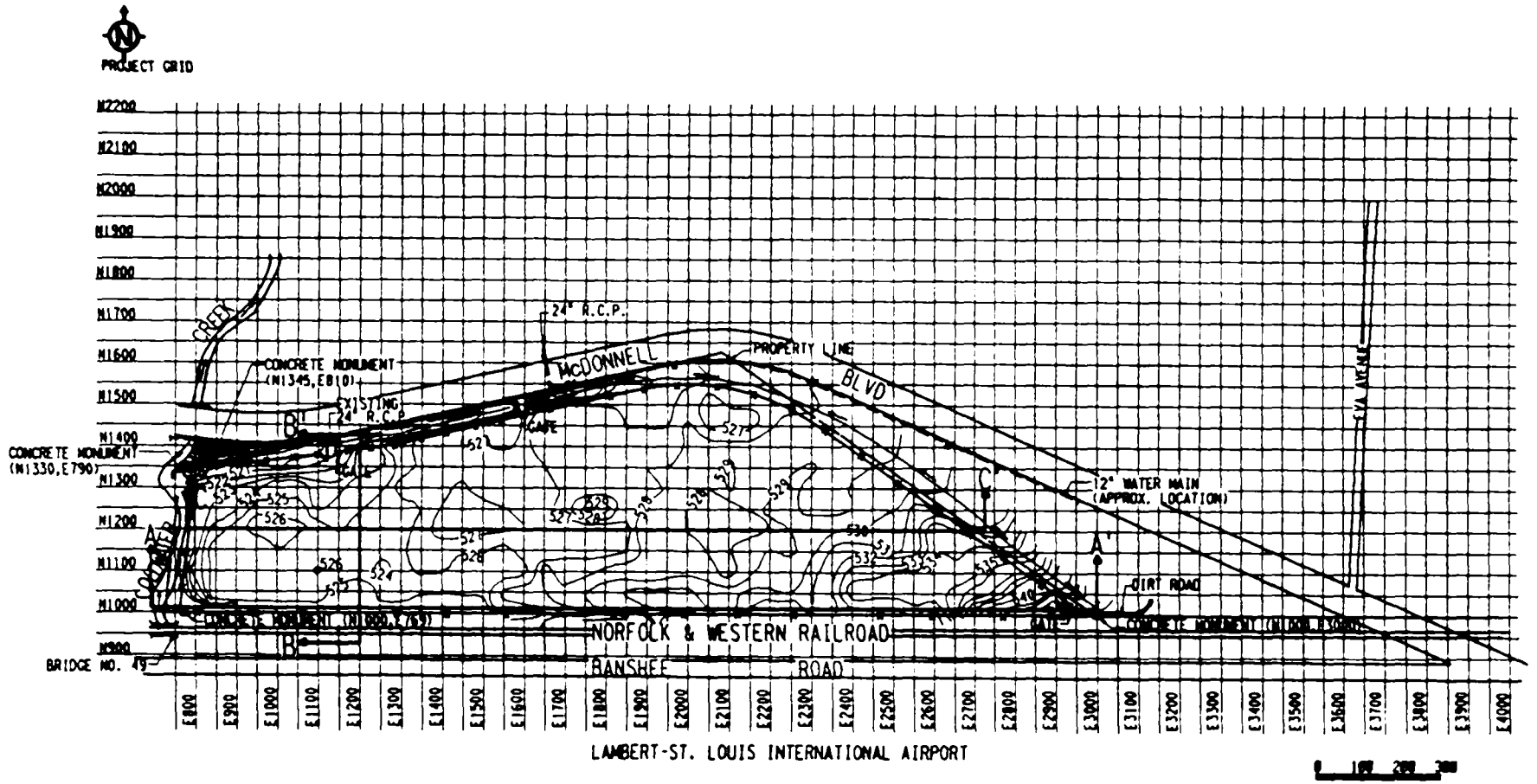


FIGURE 3
PLAN OF GEOLOGIC SECTIONS

3W9928.DGN

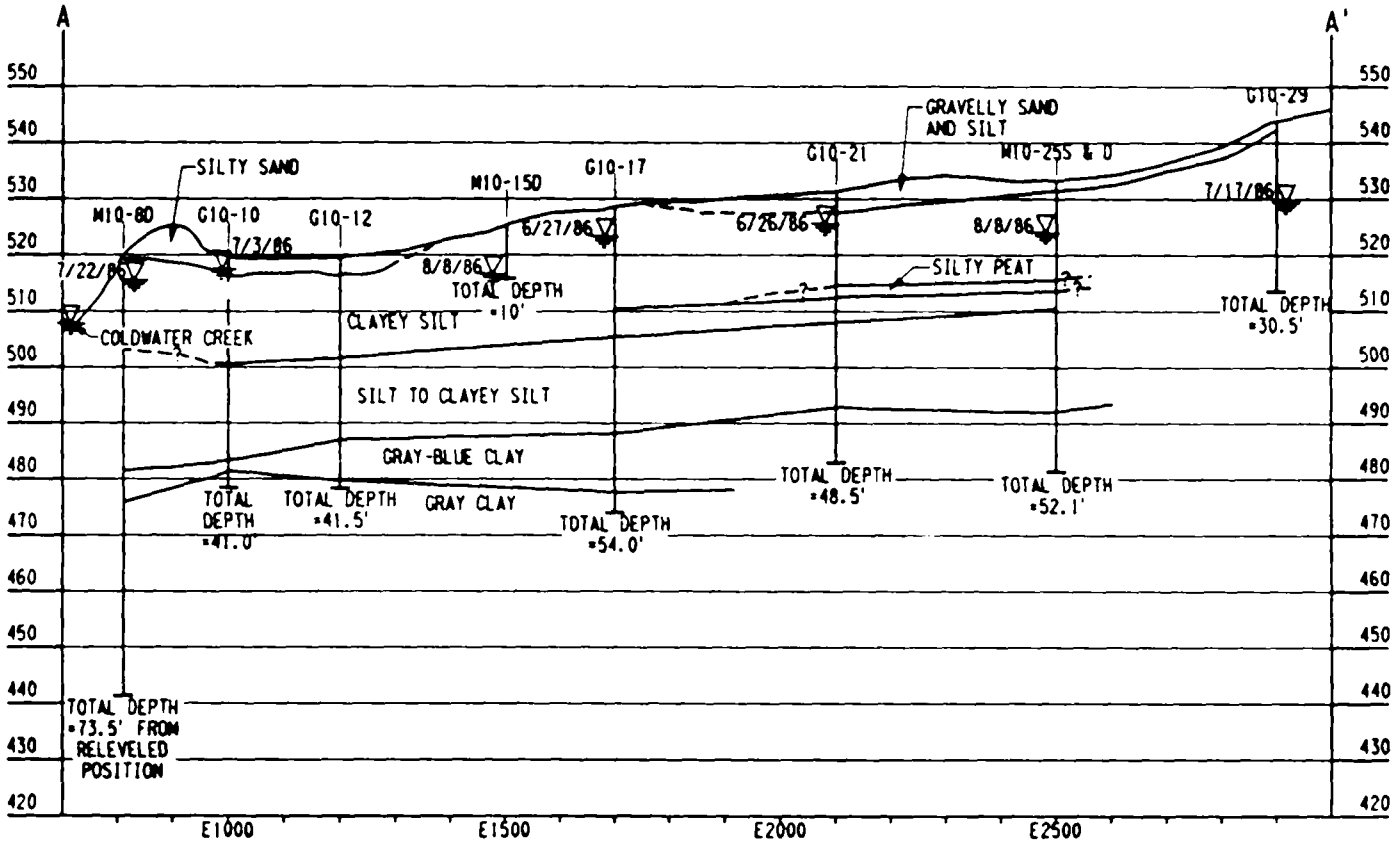


FIGURE 4
GEOLOGIC SECTION A-A'

S153W9926.DGN

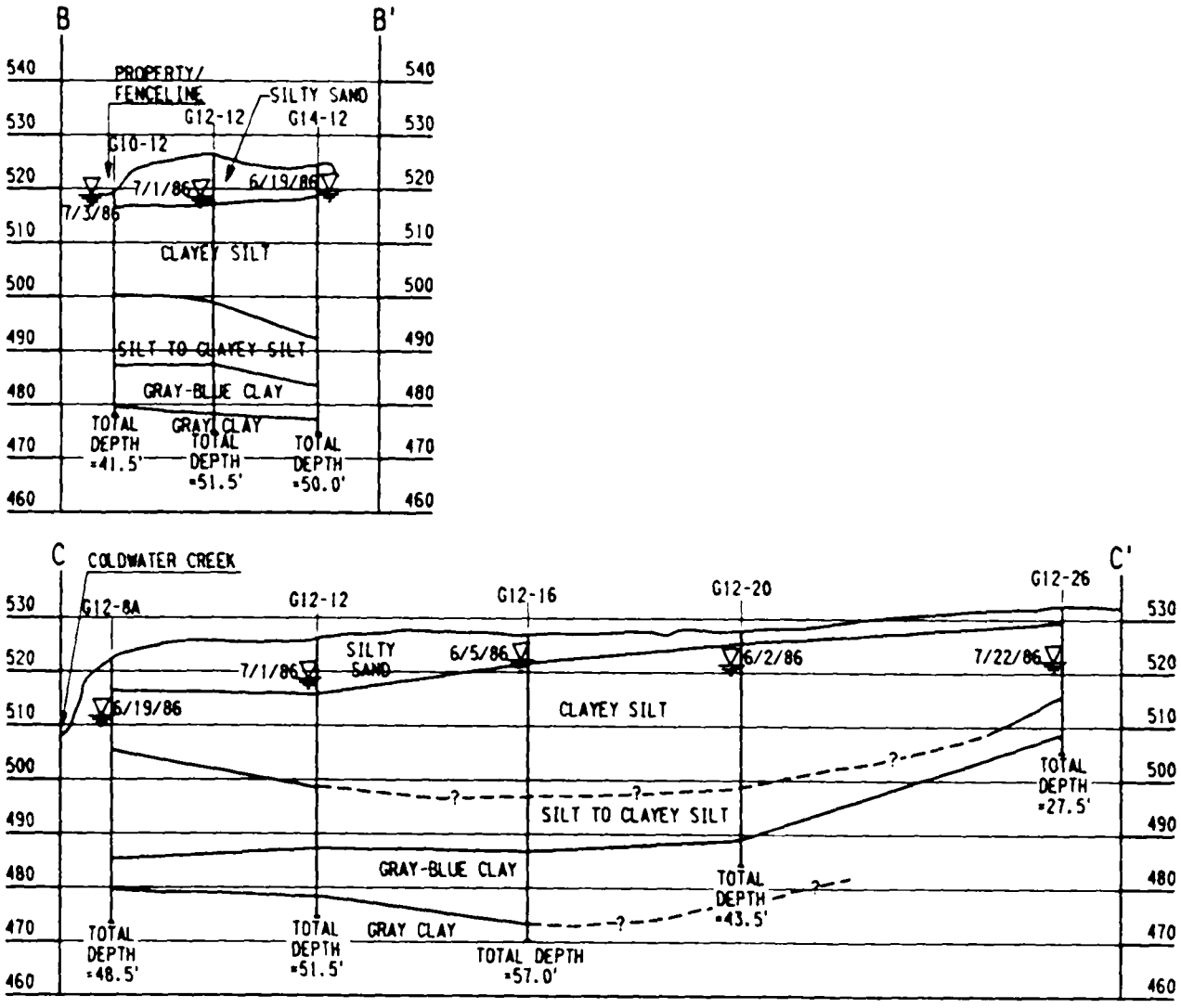


FIGURE 5
GEOLOGIC SECTIONS B-B' AND C-C'

53W9927.DGN

Table 1

DRILL HOLE SUMMARY

Hole No. (1)	Coordinates N (2)	Coordinates E (2)	Elevation (3)	Depth (ft.)	Depth of Fill (ft)	Date Drilled (4)	Date Grouted (4)	Water Level Elev. (ft)	Water Level Date (4)	Remarks
M10 8S	1010.5'	800'	520.1'	10.0	1.1	6/25				Note 5
M10 8S	1010.5'	800'	520.1'	29.0	1.1	7/28		511.5	8/7	
M10 8D	1009.5'	807.5'	519.6'	73.5		7/25		515.8	8/7	
R10 9	1015'	899'	521.1'	11.0	4.5	6/26	7/3	516.2	7/3	
G10 10	1015.5'	1000'	519.5'	41.0	3.0	6/30	7/3	517.1	7/3	
R10 11	1015.5'	1101.5'	519.4'	10.0	5.3	6/26	7/3	518.0	7/3	
G10 12	1010.5'	1198'	519.7'	41.5	3.6	7/1	7/3	519.0	7/3	
R10 13	1007.5'	1297.5'	522.3'	12.0	4.8	6/27	6/30	519.2	6/30	
R10 14	1011	1398	524.1'	10.0	4.0	6/27	6/30	519.8	6/30	
M10 15S	1009'	1505'	526.2'	29.0		7/14		520.4	8/8	
M10 15D	1008'	1498'	525.9	10.0	4.3	6/27				Note 5
M10 15D	1008'	1498'	525.9	87.1	4.3	7/22		516.5	8/8	
R10 16	1008.5'	1599'	527.4'	11.0	5.2	6/13	6/16	523.4	6/16	
R10 17	1012'	1698.5'	528.5'	9.5	2.0	6/6	6/9	524.0	6/9	Note 6
G10 17	1012'	1697'	528.5'	54.0		6/26	6/27	523.2	6/27	
R10 18	1007'	1800'	529.4'	10.0	5.1	6/6	6/9	523.8	6/9	
R10 19	1008'	1900'	530.2'	11.0	2.7	6/5	6/9	524.2	6/9	
R10 20	1011'	1996'	531.4'	11.0	3.3	6/20	6/24	525.8	6/24	
G10 21	1012'	2100'	531.3'	48.5	4.2	6/25	6/26	525.7	6/26	
R10 22	1021'	2205'	532.0'	11.0	4.6	6/20	6/24	525.9	6/24	
R10 23	1010'	2313'	533.1'	12.0	4.2	7/11	7/16	526.3	7/16	
R10 24	1010'	2400'	533.4'	12.0	4.0	7/11	7/16	522.4	7/16	
M10 25S	1009'	2500'	533.3'	8.0	2.0	7/7				Note 5
M10 25S	1009'	2500'	533.3'	27.0	2.0	7/9		524.5	8/8	
M10 25D	1012'	2508'	533.5'	52.1		7/11		523.3	8/8	
R10 26	1008'	2596	534.0'	10.5	3.5	7/9	7/17	526.0	7/17	
R10 27	1008'	2700'	539.7'	12.0	3.5	7/9	7/17	DRY	7/17	
R10 28	1008'	2800'	542.0'	12.0	2.3	7/9	7/17	530.4	7/17	
G10 29	1012	2900	543.8'	30.5	1.3	7/7	7/17	529.4	7/17	
R11 8	1099'	813'	523.0'	16.5	7.5	6/9	6/11	515.1	6/11	
M11 9	1101.5'	900'	525.5'	14.5	7.0	6/10				Note 5
M11 9	1101.5'	900'	525.5'	33.0	7.0	7/3		514.8	8/7	
R11 10	1101'	1005'	525.8'	17.5	11.0	6/10	6/12	519.3	6/12	
R11 11	1102'	1085'	525.5'	16.0	7.5	6/10	6/11	517.7	6/11	
R11 12	1100	1200	525.7	16.5	7.7	6/9	6/10	520.2	6/10	
R11 13	1098'	1297.5'	525.7'	13.0	7.5	6/9	6/10	522.1	6/10	
R11 14	1102'	1397.5'	527.2	15.0	9.6	6/18	6/18	523.2	6/18	
C11 15	1094'	1497'	526.4'	16.0	7.5	6/17	6/19	522.5	6/19	
R11 16	1102	1600	526.5	13.0	5.1	6/4	6/6	522.3	6/6	
R11 17	1101	1705	527.0	7.0	4.5	6/4	6/6			Note 7
R11 17a	1106	1705	527.0	11.0	4.2	6/4	6/6	521.7	6/6	
R11 18	1102	1808	529.2	10.0	4.0	6/5	6/11	525.4	6/11	
R11 19	1098.5'	1899.5'	528.3'	11.0	2.2	6/5	6/9	523.4	6/9	
C11 20	1100	2000	529.3	12.0	3.3	6/23	6/24	524.3	6/24	
M11 21	1098'	2095.5'	528.5'	8.0	2.4	6/24				Note 5
M11 21	1098'	2095.5'	528.5'	23.0	2.4	7/2		522.4	8/8	
R11 22	1100	2200	530.6	12.0	1.5	5/29	5/30	524.5	5/30	
R11 23	1101'	2300'	530.6'	12.0	2.5	5/29	6/10			
R11 24	1101	2398	533.9	11.0	5.0	7/11	7/26	523.4	7/26	
C11 25	1096	2501	534.3	13.0	5.5	7/8	7/26	523.1	7/26	
R11 26	1104	2601	534.5	10.0	3.7	7/9	7/17	524.0	7/17	
G11 27	1101'	2700'	535.1'	34.5	1.7	7/8	7/17	526.3	7/17	
C11 28	1102	2798	537.5	12.0	4.0	7/8	7/17	526.6	7/17	
C11 31	1073'	3098'	536.0'	12.0	0	7/15	8/12	DRY		Note 10

Table 1 (Continued)

DRILL HOLE SUMMARY

Hole No. (1)	Coordinates N (2)	Coordinates E (2)	Elevation (3)	Depth (ft.)	Depth of Fill (ft)	Date Drilled (4)	Date Grouted (4)	Water Level Elev. (ft)	Water Level Date (4)	Remarks
R12 8	1197*	808*	521.4*	11.5	4.8	6/11	6/19		6/19	Note 6
G12 8A	1197*	815*	522.4*	48.5		6/18	6/19	511.9	6/19	
R12-9	1199*	900*	526.3*	12.0	7.2	6/12	6/12	515.0	6/12	
R12 10	1210	997	527.4	13.5	9.0	6/11	6/12	523.1	6/12	
R12 11	1198	1100	526.1	15.0	3.5	6/11	6/12	518.3	6/12	
G12 12	1199*	1200*	526.4	51.5	4.7	6/27	7/1	518.7	7/1	
R12 13	1200*	1299*	526.1	10.7	5.4	6/6	6/10	525.6	6/10	
R12 14	1196*	1402*	527.7	12.5	4.5	6/18	6/19	522.5	6/19	
C12 15	1200	1500	528.0	16.0	6.6	6/19	6/19	521.2	6/19	
G12 16	1200*	1595*	527.5*	57.0	5.0	6/3	6/5	522.2	6/5	
R12 17	1197	1699	526.7	13.5	3.6	6/3	6/4	521.3	6/4	
R12 18	1196	1800	527.2	12.0	1.5	6/2	6/4	522.2	6/4	
R12 19	1194*	1897*	531.8*	12.0	6.0	7/1	7/2	524.0	7/2	
G12 20	1207*	1997*	528.0*	43.5	1.5	6/2	6/2	521.5	6/2	
R12 21	1200	2100	527.7	11.5	2.0	5/29	5/30	523.2	6/2	
R12 22	1200	2200	528.5	12.0	3.5	5/29	5/29	523.4	5/30	
G12 23	1200*	2304.5*	530.2*	32.0	1.5	5/28	5/30	523.4	5/30	
R12 24	1202	2401	529.9	10.0	2.5	5/28	5/30	523.1	5/30	
R12 25	1200	2500	530.6	13.0	3.75	5/29	6/5	522.6	6/5	
G12 26	1196*	2602*	532.6*	27.5	3.5	7/9	7/22	522.1	7/22	
R12 27	1176	2695	532.8	10.0	4.0	7/10	7/22	DRY	7/22	
R13 8	1303	808	520.6	10.5	7.0	6/11	6/12	DRY		
C13 9	1306*	895.5*	522.5*	12.0	4.1	6/12	6/13			
G13 10	1309.5*	1002*	522.3*	49.0	2.3	6/23	6/26	515.5	6/24	
R13 11	1330*	1074*	521.3*	11.0	4.2	6/12	6/13			
R13 12	1295	1200	525.2	17.5	9.0	6/9	6/13	--	-	Note 8
C13 13	1302	1300	525.7	13.0	7.0	6/30	7/1	--		
R13 14	1300	1402	527.4	11.5	5.7	6/19	6/23	--	-	
R13 15	1300	1500	527.3	12.0	6.0	6/23	6/26	521.1	6/26	
R13 16	1300	1600	527.2	11.0	4.5	6/4	6/5	522.0	6/5	
C13 17	1300	1700	527.7	12.0	6.0	6/24	6/26	521.3	6/26	
R13 18	1294	1803	527.7	12.0	2.0	7/1	7/1	522.7	7/1	
R13 19	1309	1899	527.3	10.5	2.8	6/2	6/4	522.3	6/4	
R13 20	1303	2002.5	528.8	12.0	1.4	6/2	6/4	522.9	6/4	
C13 21	1301	2104	529.6	12.0	4.0	6/23	6/24	523.4	6/24	
R13 22	1299	2199	522.8	14.0	2.0	5/27	5/29	522.8	5/29	
R13 23	1300	2302	529.1	10.0	2.0	5/28	5/29	523.3	5/29	
R13 24	1300	2400	529.3	10.5	1.8	5/28	5/29	523.0	5/29	
C13 25	1300	2500	530.3	12.0	5.8	6/20	6/24	523.8	6/24	
M13.5 8.5S	1338*	854*	521.8*	11.5	3.7	6/13	--	--		Note 5
M13.5 8.5S	1338*	854*	521.8*	32.0	3.7	7/31	--	511.7	8/7	
M13.5 8.5D	1339*	863.5*	521.8*	74.0		7/30	--	513.1	8/7	
R13.5-14	1351	1400	526.7	5.3	5.3	7/14	7/30	DRY		Note 11
G14 12	1392*	1200*	524.6*	50.0	6.0	6/13	6/19	519.9	6/19	
R14 13	1400.5	1304.5	526.3	11.0	2.0	6/6	6/23	--	-	
R14 14	1397	1400	527.2	10.0	4.0	6/30	7/1	520.5	7/1	
R14 15	1400	1500	527.4	11.5	4.0	6/6	6/10	523.8	6/10	
R14 16	1403	1600	527.8	12.0	1.0	5/21	5/23	522.4	5/23	
G14 17	1401*	1702*	527.8*	59.0	4.8	6/4	6/6	522.3	6/6	
R14 18	1405	1800	527.7	11.5	3.4	6/3	6/4	523.0	6/4	
R14 19	1400	1900	528.3	11.7	3.4	6/3	6/4	522.1	6/4	
R14 20	1400	2000	528.6	11.0	2.5	6/3	6/4	522.8	6/4	
R14 21	1400	2100	527.6	11.5	1.7	6/2	6/4	522.5	6/4	
R14 22	1400	2200	529.2	6.0	2.0	5/27	6/4	DRY		Note 9
R14 22a	1400	2199	529.2	11.0	1.8	6/2	6/2	522.5	6/4	
R14 23	1400	2300	528.6	12.5	2.5	5/27	5/29	522.3	5/29	
G14 24	1382*	2399*	527.5*	34.0	1.5	5/30	6/5	521.4	6/5	

Table 1 (Continued)

DRILL HOLE SUMMARY

Hole No. (1)	Coordinates N (2)	Coordinates E (2)	Elevation (3)	Depth (ft.)	Depth of Fill (ft)	Date Drilled (4)	Date Grouted (4)	Water Level Elev. (ft)	Water Level Date (4)	Remarks
R15 17	1487	1704	527.6	12.0	4.3	6/30	7/1	519.6	7/1	
R15 18	1500	1801	526.9	12.0	1.0	5/22	5/23	521.5	5/23	
R15 19	1500	1915	526.8	15.0	1.0	5/23	5/28	522.0	5/28	
R15 20	1500	2000	527.9	12.0	3.0	5/23	5/28	522.2	5/28	
R15 21	1500	2100	527.7	12.0	1.5	5/27	5/28	521.2	5/28	
R15 22	1485	2202	529.5	10.5	3.5	6/2	6/3	522.3	6/3	

Notes:

1. Well Codes: C = chemical sampling hole; G = geological (stratigraphic) hole; M = monitoring well; R = radiological sampling hole; S = shallow monitoring well; D = deep monitoring well. In general, R holes and C holes were drilled and sampled through the fill into radiologically uncontaminated soil. G holes and M holes were continued into uncontaminated soil after completion of radiological sampling. Samples from C holes were split for both chemical and radiological analyses. All borings were geologically logged.

2. Coordinates are approximate except where measured by tape from the nearest survey stake. Taped coordinates are noted by an asterisk (*).

3. Elevation of nearest survey stake, except where releveled in field. Releveled elevations are noted by an asterisk (*).

4. All dates are for year 1986; "date drilled" is completion date of drilling or of monitoring well installation.

5. Portion of hole drilled to collect radiological samples; conductor casing grouted to hole depth shown.

6. Drill hole was sealed after collecting radiological samples and redrilled from the surface for deeper geologic sampling.

7. Redrilled. See R11 17a located 5 ft to north.

8. Initial hole 5 ft. N abandoned at 3 ft. depth (scrap metal).

9. Redrilled. See R14 22a located 3 ft to west.

10. Hole drilled for chemical background calibration.

11. Hole drilled to investigate lined pit.